

* USE WHEN CONSTRUCTION SURVEYING AND LAYOUT IS A BID ITEM *

(925SRVY, 09/18/06)

SECTION 925 - CONSTRUCTION SURVEYING AND LAYOUT:

925-1 Description: the first paragraph of the Standard Specifications is revised to read:

The work under this section shall consist of furnishing all materials, personnel, and equipment necessary to perform all surveying, staking, establishment of all pit boundaries, laying out of haul roads, and verification of the accuracy of all existing control points which have been provided by the Department. The control point verification process shall include locating and making ties to all section line, right-of-way, and roadway monuments in the vicinity of the proposed work. Included in this work shall be all calculations required for the satisfactory completion of projects, including grade and drain, overlay, safety, landscape, rest areas, structures, surfacing projects, or combinations thereof, in conformance with the plans and these specifications. The work shall include establishing and marking 'as-built' elevations on right-of-way markers, bridges, and culverts. The work shall be done under the direction of a registered professional engineer or a registered land surveyor employed by the contractor. The crew chief shall be NSPS Certified Level III, NICET Certified Level III, or a registered Land Surveyor-in-Training. A minimum of 50 percent of the survey crew shall be either NSPS Certified Level II or NICET Certified Level II. All right-of-way monuments and lines shall be established by a registered land surveyor employed by the contractor.

925-3 Construction Requirements: of the Standard Specifications is revised to read:

925-3.01 General:

Prior to beginning any survey operations, the contractor shall furnish to the Engineer, for approval, a written outline detailing the method of staking, marking of stakes, grade control for various courses of materials, referencing, structure control, pavement markings, and any other procedures and controls necessary for survey completion. A part of this outline shall also be a schedule which will show the sequencing of the survey and layout work, throughout the course of the contract, listing a percentage of completion for each month. Section 1150, Chapter 11 of the ADOT Construction Manual shall be used by the contractor as a guide in the preparation of this outline. The ADOT Construction Manual can be obtained, for a fee, from Engineering Records, 1655 West Jackson, Room 112F, Phoenix, AZ 85007; Phone (602) 712-7498.

A minimum of two weeks prior to any paving activities, the contractor, the contractor's surveyors, the pavement marking subcontractor, and the Engineer shall meet to discuss the survey control for the applications of all temporary and permanent striping. At this meeting, the contractor shall provide a written plan, satisfactory to the Engineer, to provide survey control and layout of the temporary and permanent striping in a timely manner.

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The Department will provide either traverse or control points for establishing an accurate construction centerline and will establish bench marks adjacent to this line for the proper layout of the work as described herein. Control points will be located on centerline at the beginning and ending of the project, and at all points of curve (P.C.), points of tangent (P.T.), tangents to spiral (T.S.), spirals to tangent (S.T.), and angle points. On long tangents, additional points will be provided for continuity of line.

Traverse points, when provided, will be as follows:

For horizontal control, the Department will run a traverse from which construction centerline can be established. The control points, delineated by iron pins, marks in concrete, or similar devices, will be located to minimize the likelihood of their destruction during construction activities. Coordinates of these points and/or ties to construction centerline will be provided.

For vertical control, the Department will establish bench marks the entire length of the project at horizontal intervals not to exceed 2,500 feet.

Traverse or control points set by the Engineer will be identified in the field to the contractor.

The contractor shall verify the accuracy of the traverse or control points established by the Engineer prior to use. The contractor shall, as part of the control point verification process, locate and make ties to any section line, right-of-way, and roadway monuments which will be affected by the proposed work. After verification of these points, the contractor shall notify the Engineer in writing of the results of the verification.

For locating and establishing ties to section line, right-of-way, and roadway monuments, the contractor shall follow the standards listed in Subsection 925-3.02(B).

Throughout the work, the contractor shall set all stakes including centerline stakes; offset stakes; reference point stakes; slope stakes; pavement lines, curb lines and grade stakes; stakes for sewers, roadway drainage, pipe, under drains, clearing, paved gutter, guardrail, fence, right-of-way markers, survey monuments and culverts; blue tops for subgrade, subbase and base courses; control points for bridges, bridge piers, abutments, footings, pile cutoff, pile layout, pier caps, bridge seats, bridge beams, girder profiles and screed elevations; supplemental bench marks; permanent as-built elevation marks; and all other horizontal or vertical controls necessary for complete and accurate layout and construction of the work. Regardless of the staking method, construction stakes shall be marked in such a manner that all construction personnel can easily identify the stake location, elevation, and other appropriate information. The coordinates of any new control points established by the contractor during the course of the work shall be given to the Engineer within five working days of control point establishment.

If errors are discovered during the verification process, and control points do not agree with the geometrics shown in the plans, the contractor shall promptly notify the Engineer in writing, and explain the problem in detail. The Engineer will advise the contractor within five working days of any corrective actions which may be deemed necessary.

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Directed changes to the work shall be reimbursed under Subsection 925-5 and additional contract time may be considered for any delays.

The contractor shall be responsible for the proper layout and accuracy of all property markers and right-of-way monuments which are required by the project plans.

Structure sites shall be accurately profiled and cross-sectioned, and structure control points shall be set and checked to assure the proper construction or installation of each structure. Profiles shall be approved by the Engineer prior to constructing or installing each structure. All profile survey data shall be entered in furnished field books and preserved as a permanent project record.

The contractor shall also provide control points on the roadway, satisfactory to the Engineer, corresponding to the locations of all transition points for all lines of striping, including the beginnings, ends, breaks, and changes in the striping, including all tapers in the striping and pavement edges.

The contractor shall exercise care in the preservation of stakes, references and bench marks and shall reset them when any are damaged, lost, displaced or removed.

On all projects, the centerline layout for the final surface course shall be established by instrument survey by the contractor and shall serve as marks for permanent traffic centerline striping. On projects requiring contractor striping, at a minimum, points at 50-foot intervals shall be set for each traffic lane, at the beginning and ending of each yellow stripe, and the beginning and ending of gores and tapers.

On projects where there are no passing zones, the contractor shall not rely entirely on survey for layout. The contractor shall contact the ADOT No Passing Zone Crew at the phone number provided on the project plans.

On projects where traffic is being carried through the work zone, pavements shall be marked for traffic centerline delineation before the end of each work shift. Temporary pavement markings shall conform with the requirements set forth under Subsection 701-3.05 of these specifications and any subsequent modifications thereto.

Any discrepancies in grade, alignment, earthwork quantities, locations or dimensions detected by the contractor shall immediately be brought to the attention of the Engineer. No changes in the project plans will be allowed without the approval of the Engineer. Requests for verification of earthwork quantities shall be in accordance with Subsection 203-2.01.

The Department reserves the right to make inspections and random checks of any portion of the staking and layout work. If, in the Engineer's opinion, the work is not being performed in a manner that will assure proper controls and accuracy, the Engineer will order any or all of the staking and layout work redone at no additional cost to the Department.

If any portion of the contractor's staking and layout work is ordered redone, resulting in additional rechecking by the Department, the Department shall be reimbursed for all costs

for such additional checking. The amount of such costs will be deducted from the contractor's monthly estimate.

Inspection of the contractor's layout by the Engineer and the acceptance of all or any part of it shall not relieve the contractor of its responsibility to secure the proper dimensions, grades and elevations of the several parts of the work.

925-3.02 Resetting Monuments:

(A) General:

The contractor shall be responsible to maintain all existing monumentation, including section line, right-of-way, and roadway monumentation. Monumentation disturbed during construction shall be re-established by the contractor, and recorded at the appropriate county recorder's office, at no additional cost to the Department.

(B) Monumentation Standards:

Monuments shall be re-established following the procedures in the Manual of Surveying Instructions 1973, published by the U.S. Department of the Interior, Bureau of Land Management, and all applicable statutes and requirements specified in the Arizona State Board of Technical Registration's "Minimum Standards for Land Surveying in Arizona." The contractor shall also follow the ADOT Right-of-Way Standards when re-establishing right-of-way monuments.

(C) Procedures:

Section line, right-of-way, and roadway monumentation re-established by the contractor shall bear the registration number of the Land Surveyor in responsible charge of the location.

Monuments used to define section lines shall be stamped in accordance with Manual of Surveying Instructions 1973, published by the Department of Interior, Bureau of Land Management. Roadway monumentation shall be stamped in accordance with the requirements of the appropriate municipal jurisdiction. Right-of-way monuments shall be stamped in accordance with the ADOT Right-of-Way Standards.

Monuments that are re-established shall be recorded at the appropriate county recorder's office, and a copy of the Corner Recordation documentation shall be submitted to the Engineer with five working days of recordation.

925-3.03 Office Survey Work:

The contractor shall be compensated for office work associated with project survey under the following circumstances:

- (A) When the project plans fail to provide sufficient information to lay out the project or any part thereof.

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- (B) When the contractor performs office survey work based on erroneous plans information which results in the duplication of work.
- (C) If the Department should change any plans information for which the contractor has already performed office work which results in the duplication of that work.

The contractor shall not be due compensation for any office survey work:

- (A) When information provided in the plans is sufficiently complete to allow any additional information necessary for the complete layout of the project to be routinely calculated.
- (B) When the contractor fails to inform the Engineer of discovered plan errors prior to the performance of any extra office survey work.
- (C) That is included in any other existing pay item.

The contractor shall inform the Engineer in a timely manner of any omissions, ambiguities, or errors which the contractor feels may result in extra office survey work, so as not to delay the project or create any unnecessary calculations.

All office survey work shall be documented by the contractor and verified by the Engineer for compensation. Documentation shall consist of at least a detailed office diary specifically addressing the work involved in the alleged problem area. The contractor may be required to provide the calculations, charts, graphs, drawings, or any other physical evidence which will verify the extra work.

925-3.04 Survey Manager:

The contractor shall be compensated for a survey manager when deemed necessary for extra work ordered by the Engineer. The use of a survey manager, along with all survey manager duties required as a result of the additional work, must be authorized in advance by the Engineer. The survey manager shall be a Registered Land Surveyor in the State of Arizona.

925-4 Method of Measurement: of the Standard Specifications is revised to read:

Construction surveying and layout will be measured as a single complete unit of work.

One-, two-, and three-person survey parties, survey managers, and office survey technicians will be measured by the hour to the nearest half hour.

925-5 Basis of Payment: the first two sentences of the second paragraph of the Standard Specifications are revised to read:

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If additional staking and layout are required as a result of additional work ordered by the Engineer, such work will be paid under ITEM 9250101 - ONE-PERSON SURVEY PARTY at the predetermined rate of \$65 per hour, ITEM 9250102 - TWO-PERSON SURVEY PARTY at the predetermined rate of \$100 per hour, ITEM 9250103 - THREE-PERSON SURVEY PARTY at the predetermined rate of \$135 per hour, ITEM 9250106 – SURVEY MANAGER at the predetermined rate of \$100 per hour, and ITEM 9250105 - OFFICE SURVEY TECHNICIAN at the predetermined rate of \$70 per hour.

925-5 **Basis of Payment:** the third paragraph of the Standard Specifications is revised to read:

The amount per hour for a one-person, two-person, or three-person survey party includes the cost of all work necessary to complete the extra work.

925-5 **Basis of Payment:** the sixth paragraph of the Standard Specifications is revised to read:

The amount per hour for a survey manager and an office survey technician shall include all necessary office supplies and equipment, such as calculators and computers.

925-5 **Basis of Payment:** of the Standard Specifications is modified to add:

Unless otherwise directed by the Engineer, requests for payment for additional survey work performed shall be submitted prior to the end of the monthly estimate billing period during which the work is performed.